

CLAIMS

What is claimed is:

1. A lance tube nozzle block for a sootblower, comprising:
 - a nozzle block body defining a longitudinal axis, a hollow interior, a distal end, and a proximate end with the proximate end receiving the cleaning medium;
 - a downstream nozzle positioned on the nozzle block body, the downstream nozzle having a first inlet end, a first outlet end, and a first throat, the first throat being positioned between the first inlet end and the first outlet end and having a first geometry; and
 - an upstream nozzle positioned longitudinally from the position of the downstream nozzle farther from the distal end than the position of the downstream nozzle, the upstream nozzle having a second inlet end, a second outlet end, and a second throat, the second throat be positioned between the second inlet end and the second outlet end, the upstream nozzle having a second geometry different than the first geometry of the downstream nozzle,

the cleaning medium flowing in the direction of the longitudinal axis from the proximate end towards the distal end through the nozzle block body hollow interior and entering the downstream and upstream nozzles through the respective first and second inlets and discharging from the downstream and upstream nozzles from the respective outlet ends.
2. The nozzle block of Claim 1 wherein the first throat has a first throat area, the first outlet end has a first exit area, the second throat has a second throat area, and the second outlet end has a second exit area, the ratio of the first exit area

to the first throat area being different than the ratio of the second exit area to the second throat area.

3. The nozzle block of Claim 1 wherein the downstream nozzle has a first expansion zone having a first expansion length extending between the first throat and the first outlet end, and the upstream nozzle has a second expansion zone having a second expansion length extending between the second throat and the second outlet end, the first expansion length being different than the second expansion length.

4. The nozzle block of Claim 1 wherein the downstream nozzle has a first expansion zone with a first expansion length extending between the first throat and the first outlet end, the first outlet end having a first exit diameter, the upstream nozzle has a second expansion zone with a second expansion length extending between the second throat and the second outlet end, the second outlet end having a second exit diameter, the ratio of the first expansion length to the first exit diameter being different than the ratio of the second expansion length to the second exit diameter.

5. The nozzle block of Claim 1 wherein the downstream nozzle has a first expansion zone with a first expansion length extending between the first throat and the first outlet end, the first throat having a first throat diameter, the upstream nozzle has a second expansion zone with a second expansion length extending between the second throat and the second outlet end, the second throat having a second throat diameter, the ratio of the first expansion length to the first throat diameter

being different than the ratio of the second expansion length to the second throat diameter.

6. The nozzle block of Claim 1 wherein the downstream nozzle includes a first converging section near the downstream nozzle inlet end and a first diverging section joining the first converging section and terminating with the first outlet end, a first throat area being defined at the point where the first converging section and the first diverging section are joined, and the upstream nozzle includes a second converging section near the upstream nozzle inlet end and a second diverging section joining the second converging section and terminating with the second outlet end, a second throat area of the second throat being defined at the point where the second converging section and the second diverging section are joined.

7. The nozzle block of Claim 1 wherein the downstream and upstream nozzles are diametrically oriented from one another.

8. The nozzle block of Claim 1 wherein the downstream nozzle is positioned adjacent the distal end of the nozzle block body.

9. The nozzle block of Claim 8 wherein the downstream nozzle has a first axis of discharge aligned substantially perpendicular to the nozzle block body longitudinal axis, and wherein the flow of the cleaning medium does not flow substantially beyond the downstream nozzle inlet end.

10. The nozzle block of Claim 9 wherein the upstream nozzle has a second axis of discharge aligned substantially perpendicular to the nozzle block body longitudinal axis.

11. The nozzle block of Claim 9 wherein the upstream nozzle has a second axis of discharge tipped from perpendicular to the nozzle block body longitudinal axis toward the proximate end.

12. The nozzle block of Claim 11 wherein the second axis of discharge defines a curved line.

13. The nozzle block of Claim 11 wherein the second axis of discharge defines a straight line.

14. The nozzle block of Claim 1 wherein the first throat has a first diameter that is larger than a second diameter of the second throat.

15. The nozzle block of Claim 1 wherein the cleaning medium is comprised at least in part of steam.